

Study of Occupational Noise Levels of Industries and Hearing Impairment of Workers in Western Province

By

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Thesis submitted in partial fulfillment of the requirements for the Masters Degree of Environmental Engineering and Management



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Dedication -

***Those who want to improve productivity through healthy
working population***



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Abstract

Occupational noise should be given due concern as it can cause psychological and physiological damage on human beings. Out of the physiological effects of noise, the hearing impairment is important as it is permanent damage and there is no medical treatment to cure it.

At present, Industrial Safety Division of the Labour Department receives complaints in respect of occupational noise problems from workforces of various industries in Sri Lanka. However there is no proper legislation pertaining to occupational noise aspects in Sri Lanka. Therefore it is vital to have proper remedial measures on occupational noise to abate the noise in the factory premises and to prevent hearing loss in the workers exposed to excessive noise.

In view of understanding the gaps and drawbacks of the present situation on occupational noise, the literature survey on legislations/ guidelines on occupational noise was carried out for twenty seven countries and the remedial measures in those legislations/ guidelines were identified.

This study mainly focuses on the noise levels of industries and hearing impairment of workers in Western Province.

In the field work, equivalent continuous noise level was measured for eighty factories during the working hours. The factories were categorized in to four groups depending on the measured noise levels. They are noise level equal or above 90 dBA, equal or above 85 and less than 90 dBA, equal or above 80 and less than 85 dBA, and less than 80 dBA.

Hundred and forty workers were tested for audiometry to find out Hearing Threshold Levels (*HTL*), from each exposure group over 80 dBA and in a reference group, in accordance to *ISO 8253* of 1984. Measured *HTL* was prepared according to hearing impairment equations of *ISO 1999* of 1990 and age correction was also applied to the data according to *ISO 7029* of 1984. Audiometric chart was prepared with the means of *HTL* in samples. Means of *HI* levels in each sample were compared. The hypothesis test was applied to test whether the sample mean for *HI* really exceeds 25 dB. The difference of sample means and reference group means were tested for significance of 95 percent confidence level. Percentage of workers *HI* levels equal or above 25dB, equal or above 30dB and equal or above 35 dB were compared for samples. Hearing impairment of workers for all groups were compared for duration of exposure.

From the analysis it was found that when greater the exposure level, higher the risk of hearing impairment. In $Leq \geq 90$ dBA group, the population mean of *HI* level with 95% confidence level exceed 25 dB. The $Leq \geq 90$ dBA group was exceptional and showed significant difference of means at ninety nine percent confidence level in respect of other groups. In conclusion from this study it could be recommended that a value less than 90 dBA to be the appropriate permissible equivalent noise level for a period of eight hour exposure per day.



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Abbreviation and Acronyms

AAOO	- American Academy of Ophthalmology and Otolaryngology
ASHA	- American Speech Language Hearing Association
BOI	- Board of Investment of Sri Lanka
BS	- British Standard
ILO	- International Labour Organization
ISO	- International Standard Organization
dBa	- Decibel 'A' weighted
Equ	- Equation
HI	- Hearing Impairment
HTL	- Hearing Threshold Level
Hz	- Hertz
Leq	- Equivalent continuous sound pressure level
Lpeak	- Maximum of instantaneous sound pressure level
Lrms	- Root mean square of sound pressure level
NIOSH	- National Institute of Occupational Safety and Health, USA
NIPTS	- Noise Induced Permanent Threshold Shift
PEL	- Permissible Exposure Limit
UK	- United Kingdom
USA	- United States of America
Fence	- The hearing threshold level above which a material impairment of hearing is considered to have occurred.
Intensity Ratio	- An increment of decibels that requires the halving of exposure time, or decrement of decibels that requires the doubling of exposure time.

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